Congressional Notification Profile
DE-PS26-02NT41369

UNIVERSITY COAL RESEARCH PROGRAM, INNOVATIVE CONCEPTS PROGRAM
University of North Dakota

Background and Technical Information:
Project Title: "Mercury Oxidation Via Catalytic Barrier Filters."

The University of North Dakota will study the effectiveness of controlling mercury emissions from coal-fired plants by coating filters with catalytic materials. By doing so, elemental mercury would be oxidized, allowing a plant's emissions-control devices to capture more mercury with virtually no additional capital costs. The university will screen potential catalysts that are most amenable to oxidizing mercury, test catalysts in a gas stream, and impregnate filters with the best catalyst and test its performance.

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Congressional District: 01 District County: Grand Forks

Financial Information:

Length of Contract (months): 12
Government Share: $49,942
Total value of contract: $49,942

DOE Funding Breakdown:
Funds: FY 2002 $49,942

MERCURY OXIDATION VIA CATALYTIC BARRIER FILTERS

The goal of this proposed one-year Novel Concepts project is to explore the feasibility of oxidizing elemental mercury in coal combustion flue gas using catalytic material impregnated onto barrier filters. Oxidizing elemental mercury will increase the effectiveness of control technologies for the removal of mercury from coal combustion flue gas prior to emission.

Coal- fired utility boilers account for about 31% of the total U.S. anthropogenic emissions (40 to 50 tons annually). Equilibrium calculations predict that elemental mercury should be almost completely converted to oxidized forms of gas or solid phase mercury (Hg 2+) upon cooling, however, measurements of flue gas from boilers burning different coals typically show only 35% to 95% oxidation. This is unfortunate since the performance of sorbents is reduced for elemental mercury while none of the current wet scrubber methods capture any appreciable elemental mercury. Thus, if mercury control targets are to be met and control costs reduced, methods to oxidize the elemental mercury to Hg 2+ in the flue gases from coal-fired power plants must be developed.

The proposed project will address this issue through the use of catalytic material impregnated onto barrier filters. Barrier filters will provide excellent contact between the mercury and catalyst and reduce the gas-film dependency observed for other contacting configurations substantially reducing the amount of catalyst required to accomplish removal of elemental. Further, for existing and planned facilities utilizing barrier filters, this oxidation can be accomplished with virtually no additional capital expense.

Accomplishment of this goal will involve three basic activities, namely 1) screening of potential catalysts and identifying the most attractive mercury oxidation catalyst candidates, 2) testing candidate catalysts in a simulated gas stream, and 3) impregnating a
barrier filter(s) with the best catalyst and testing its performance. The success of the project will be indicated by the ability to impregnate the barrier filter material, to obtain high levels of mercury oxidation, and to minimize the amount of SO3 formation. Based upon success at this level, future work would involve a more rigorous investigation of impregnating techniques, filter materials, catalyst concentration, variability of gas composition, catalyst deactivation/poisoning and catalyst life.

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